

The Patriot: Design of an Unmanned Aerial Vehicle

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Every year, the State University of New York Two Year Engineering Science Association (SUNY TYESA) creates a design competition for freshman and sophomore students who are currently attending two-year colleges and are enrolled in engineering programs to participate in. For the spring of 2018, the design challenge was to create a mini unmanned aerial vehicle that is capable of maneuvering through obstacles, changing altitude, and delivering a payload to a proper drop off zone using a light sensor. The idea behind the project was to simulate using an unmanned aerial vehicle to deliver a rescue kit where it is too difficult or dangerous for humans to traverse.

The unmanned aerial vehicle was designed using carbon fiber arrow shafts and student designed 3D printed motor mounts, body, battery clamps, and arm covers. The light sensor, which helped to deliver the payload, was composed with an Arduino Mini controller, a micro servo and light sensor which was able to be programmed to deliver the payload when a certain color light was detected. However, the team faced some issues with the original design finding that while printing the parts allowed for a cost-efficient vehicle, a lot of time was also spent printing and updating parts that were stressed and weakened during trials.

The team was able to use a finite element analysis to improve the quality of parts printed by determining the major points of stress. Improvements were made by adding supports to the parts, thickening the parts, and the parts were printed solid instead of hollow. These minor improvements to the stability of the vehicle allowed a large improvement in responsiveness during flight, while the vehicle was still able to maintain a steady speed. The team's updates to their parts were successful, enabling them to take second at the New York State competition.